



1 April to 30 June 2021 - Quarter 2 Environmental Monitoring Results Summary

Name of Mine	Northparkes Mines
Name of Leaseholder and Mine Operator	CMOC Mining Pty Ltd
Mining Leases	ML1247, ML1367, ML1641 and ML1743
Environment Protection Licence	EPL 4784
Development Consent	DC11_0060, (as modified)

Reviewed by	Chris Higgins
Title	Superintendent – Environment and Farms
Date	
Signature	
Approved by	Stacey Kelly
Title	Manager – People, Safety and Environment
Date	
Signature	

1. SCOPE OF REPORT

This report provides a summary of monitoring results for the period from 1 April to 30 June 2021. This monitoring is undertaken in accordance with the Environmental Monitoring Program (available at www.northparkes.com.au). Details of air quality, noise and water monitoring locations are available in the Environmental Monitoring Program.

2. AIR QUALITY

The air quality monitoring program utilises PM₁₀ (beta attenuated monitors), TSP's (high volume air samplers (HVAS)) and depositional dust gauges. Monitoring locations are strategically positioned around the mine lease and neighbouring properties. TSP and PM₁₀ monitoring have been undertaken at three nearby farm residences Hubberstone, Milpose and Hillview. A summary of the monitoring results are provided below.

2.1 PM₁₀

PM₁₀ monitoring results for the 'Hubberstone', 'Milpose' and 'Hillview' monitoring locations, for the reporting period, are displayed in Figure 1, Figure 2 and Figure 3 respectively. The criteria for exceedances (as nominated in the Development Consent DC11_0060, known as the Consent), are >30 µg/m³ for the annual average and >50 µg/m³ for a 24-hour monitoring period. Refer to Appendix A for map of all PM₁₀ monitoring locations.

A dust event was observed on 15 May as a result of strong winds generating particulates from the surface of TSF1. The combination of TSF1 being inactive, no recent rainfall and strong winds generated particulates from the facility which were then observed. Nearby receiver "Hubberstone" recorded a 24 hour reading of 47.4 µg/m³, slightly below the 50 µg/m³ limit detailed in the Consent. Following observed dust being generated from the facility, Northparkes mobilized water carts to target the source. Ripping of TSF1 occurred prior to the next high-risk day which proved successful.

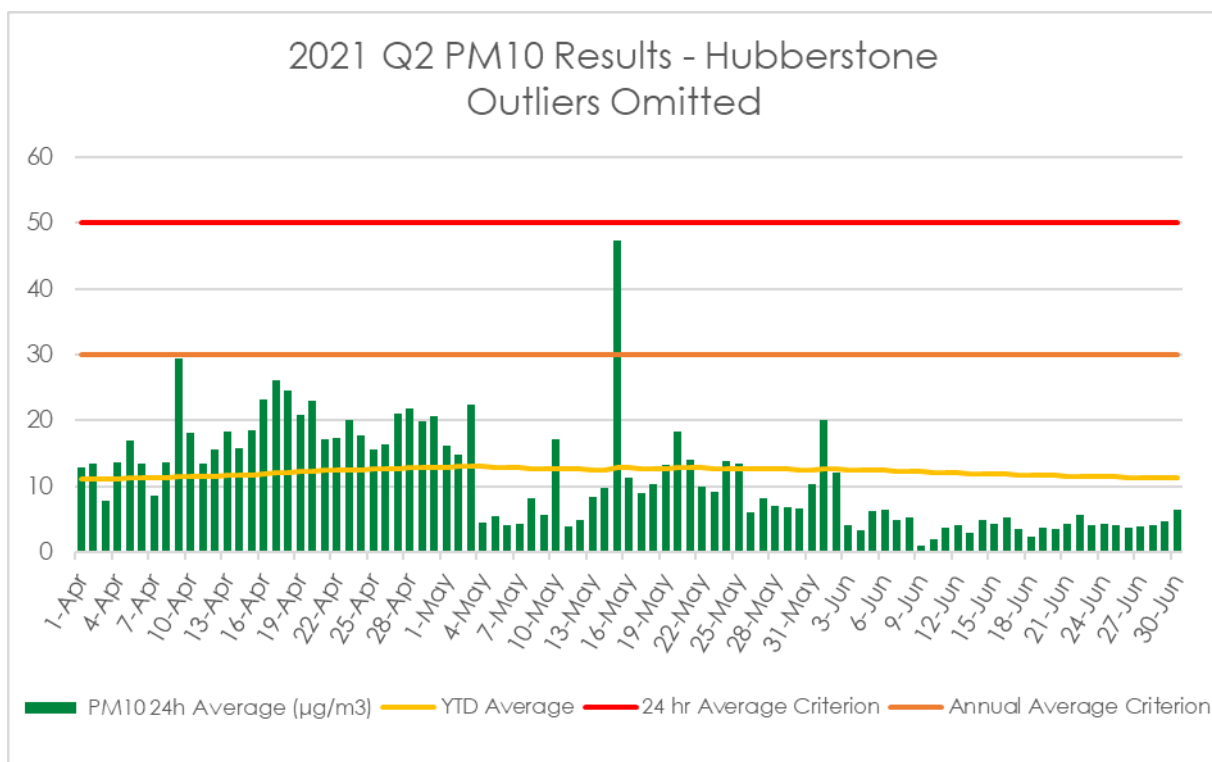
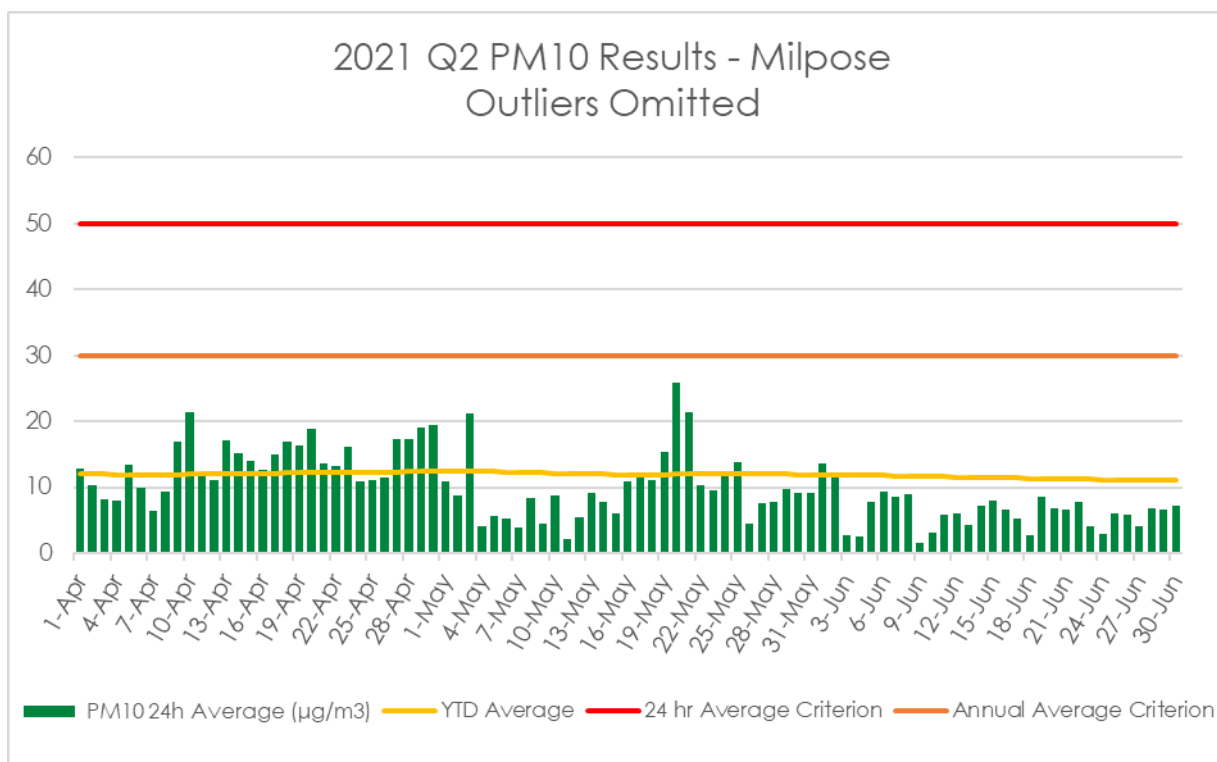
During the reporting period no exceedances of the Consent criteria were recorded.

Annual Averages:

Annual averages recorded at all monitoring locations are below the Consent criteria of 30 µg/m³, recording:

- 11.3 µg/m³ at Hubberstone
- 11.0 µg/m³ at Milpose, and
- 8.3 µg/m³ at Hillview.

Refer to Appendix A for map of all PM₁₀ monitoring locations.

**Figure 1:** Hubberstone**Figure 2:** Milpose

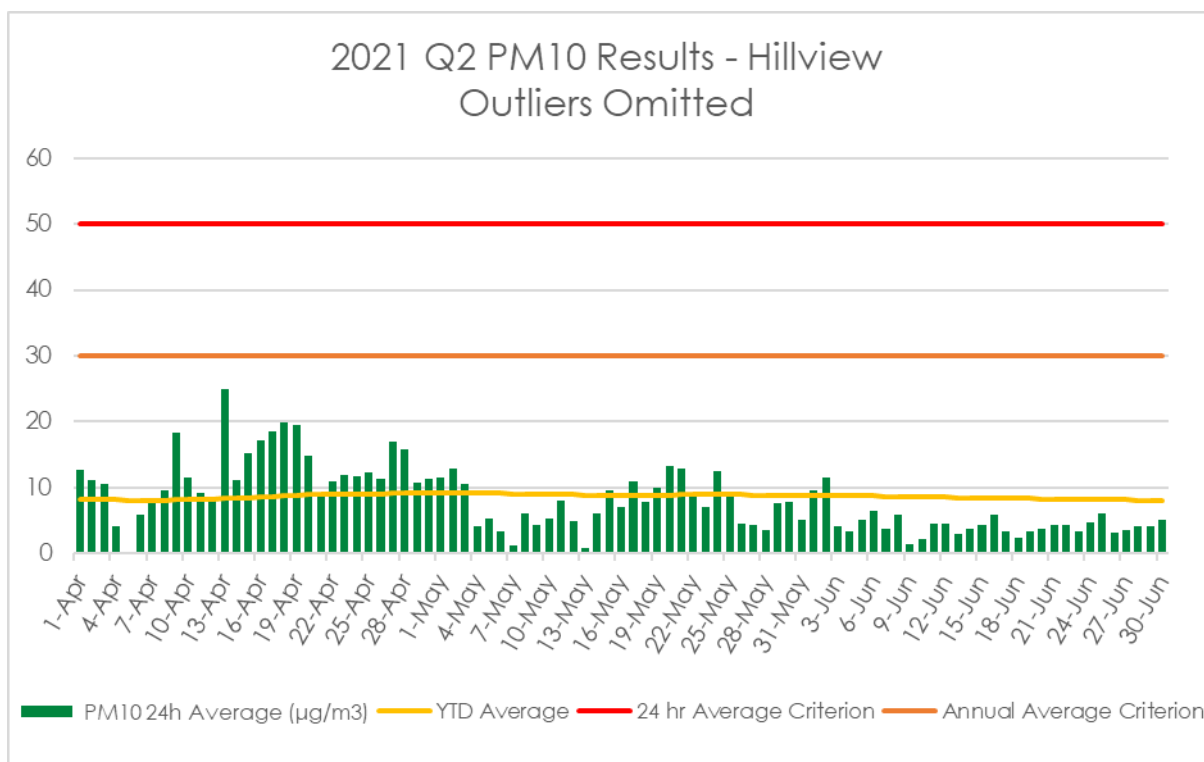


Figure 3: Hillview

2.2 TSP

Hubberstone, Milpose and Hillview all recorded dust levels at the TSP monitoring locations under the required average annual criteria set by the Consent ($90 \mu\text{g}/\text{m}^3$) for the quarter for the reporting period.

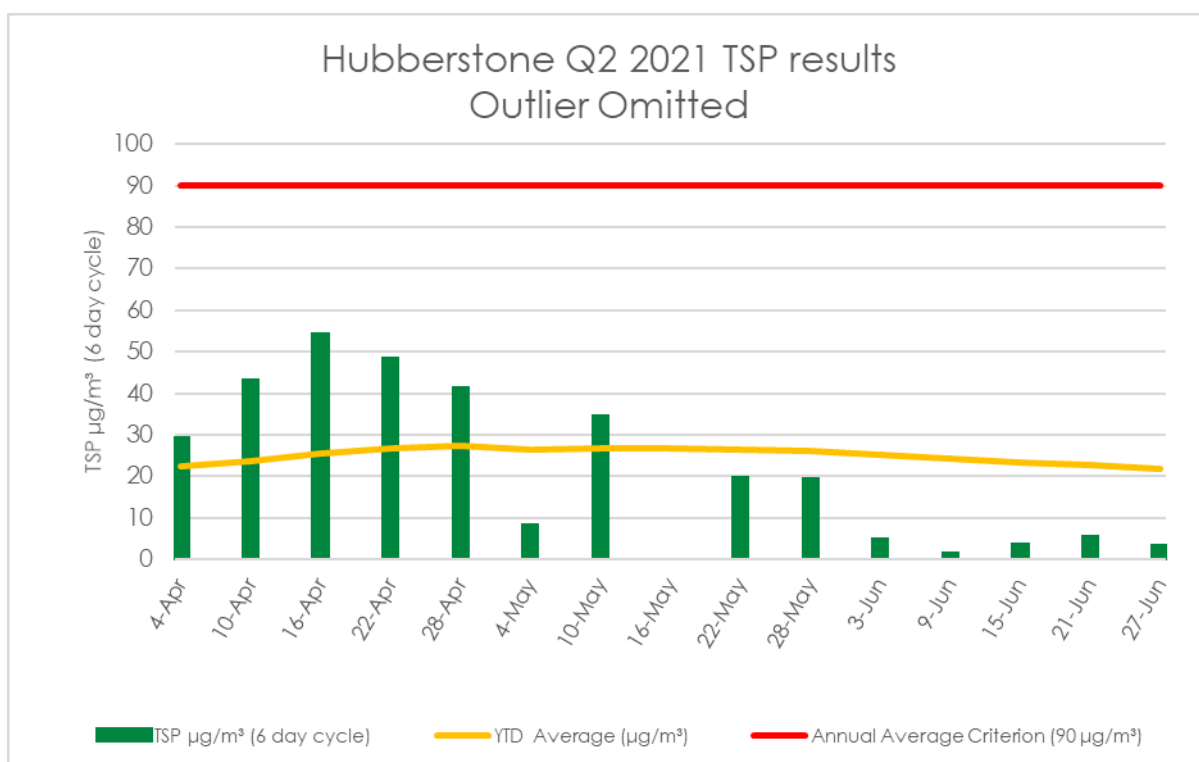
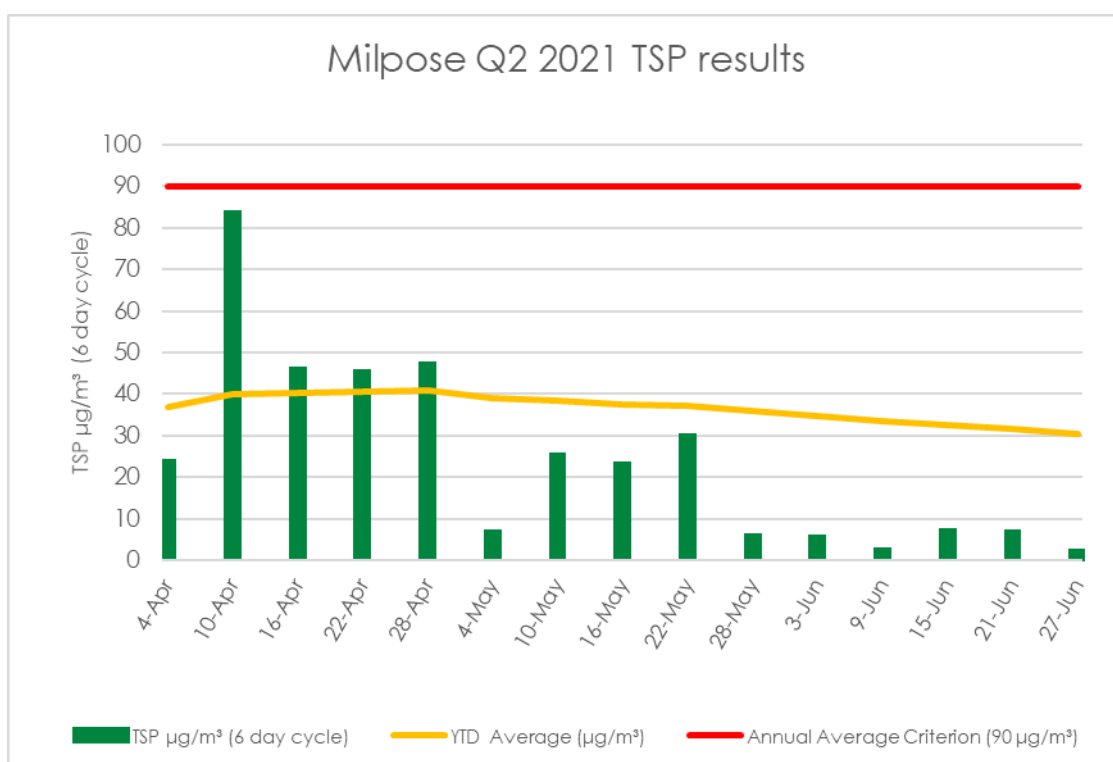
The missing result at Hubberstone on 16 May was due to a power outage at the property.

Annual Averages:

Annual averages recorded at all monitoring locations are significantly below the Consent criteria of $90 \mu\text{g}/\text{m}^3$, recording:

- $22.8 \mu\text{g}/\text{m}^3$ at Hubberstone
- $26.8 \mu\text{g}/\text{m}^3$ at Milpose, and
- $20.4 \mu\text{g}/\text{m}^3$ at Hillview.

Refer to Appendix A for map of all TSP monitoring locations.

**Figure 4:** Hubberstone**Figure 5:** Milpose

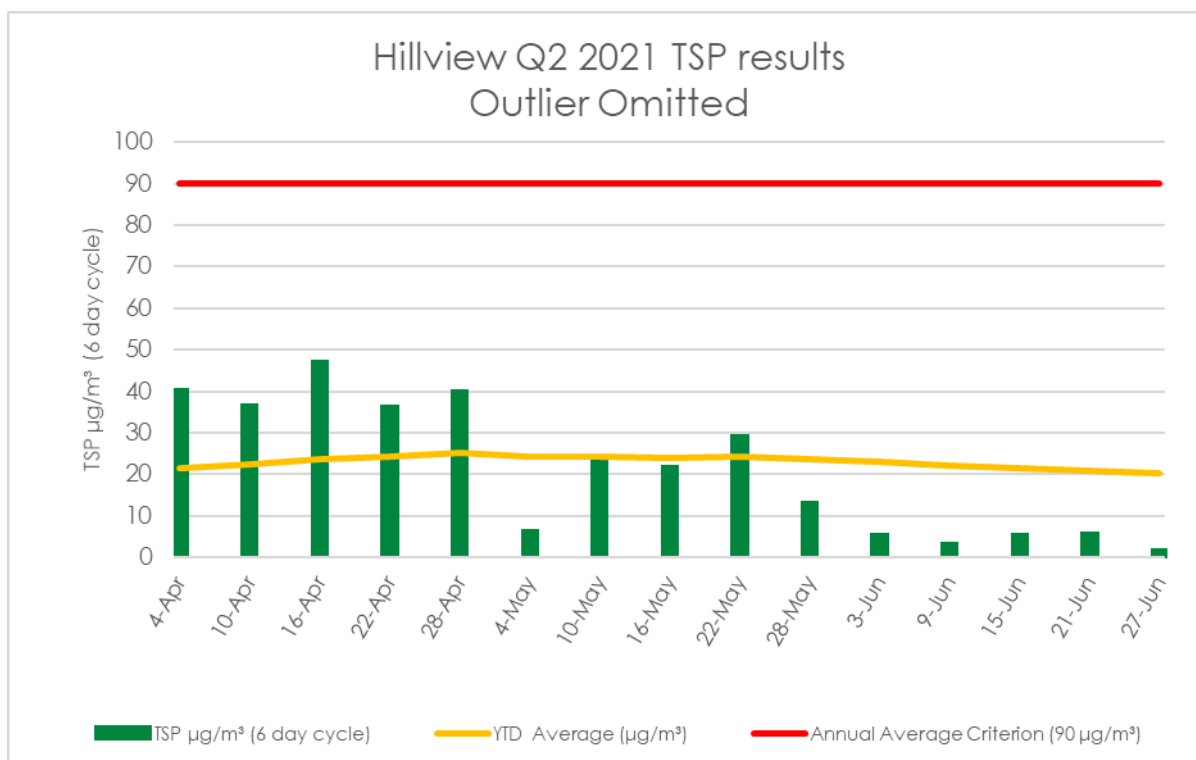


Figure 6: Hillview

2.3 Depositional Dust

Depositional dust gauges record the total of deposited dust for a month-long period and are a measure of broad scale changes to the local air quality.

Eleven depositional dust gauges are located across the mining lease and neighbouring residential properties to monitor atmospheric dust. A summary of the monthly monitoring results at each monitoring location are presented the figures below. Please be advised that only monitoring locations ND19, ND20, ND21 & ND22 are regulated by the criteria stated in the Consent, as they are the only depositional dust gauges that are at a residence on privately-owned land. All other depositional dust gauges are used to inform operational activities. Refer to Appendix B for map of all depositional dust monitoring locations.

The indicative annual average for all locations are below the long-term impact assessment criteria ($4 \text{ g}/\text{m}^2/\text{month}$), complying with the conditions of the Consent.

During the quarter, TDNE and TDN5 recorded results above the internal trigger level of $4.0 \text{ g}/\text{m}^2/\text{month}$, and ND22 exceeding the Consent criteria by $0.2 \text{ g}/\text{m}^2$ during the month of April. An internal investigation was undertaken for this result and is detailed below.

ND22:

- April: $4.2 \text{ g}/\text{m}^2/\text{month}$ – a decrease of $2.5 \text{ g}/\text{m}^2/\text{month}$ was recorded from the previous March monitoring period. As identified previously, this bottle sits underneath a tree line, and is not situated at a site compliant with AS/NZS 3580.1.1:2016 “Methods for sampling and analysis of ambient air Part 1.1: Guide to siting air monitoring equipment”. The bottle has been moved approximately 12 m from its previous position away from the tree line. Both May and June analysis have showed a significant decrease in total insoluble matter.

TDN5:

- May: 5.0 g/m²/month – the elevated TDN5 result was noted to have potentially occurred as a result of localised farming practices or vehicle movements along the adjacent unsealed road. No significant observations were made at the time of collection. The result will be observed during the next monitoring periods for upward trending and to determine a probable cause.

TDNE:

- April: 6.6 g/m²/month – Analysis showed that results have decreased significantly over the previous months. Significant amounts of organic content suggest that the result was contaminated with foreign material. Observations of bird droppings around the gauge draw a likely conclusion that the monitoring location is favourable to local birds and is subsequently impacted by their activities. A large object was observed decaying in the bottle upon sample retrieval.
- May: 12.3 g/m²/month – Analysis of this result showed that combustible matter results increased slightly to during the month. Observations during the sampling period noted that the gauge had a large pellet from a predatory bird in the funnel. This may also be the cause of the elevated reading during the previous months. A deterrent has been installed at the monitoring location to reduce the likelihood of future contamination. Since the addition of the deterrent to the monitoring location, the colour of the water in the bottle has returned to a clearer, cleaner turbidity showing that the potential elevation was more than likely due to bird droppings/pellets. The June result of 2.1 g/m²/month provides a positive indication that the deterrent is working, removing the potential source of contaminants.

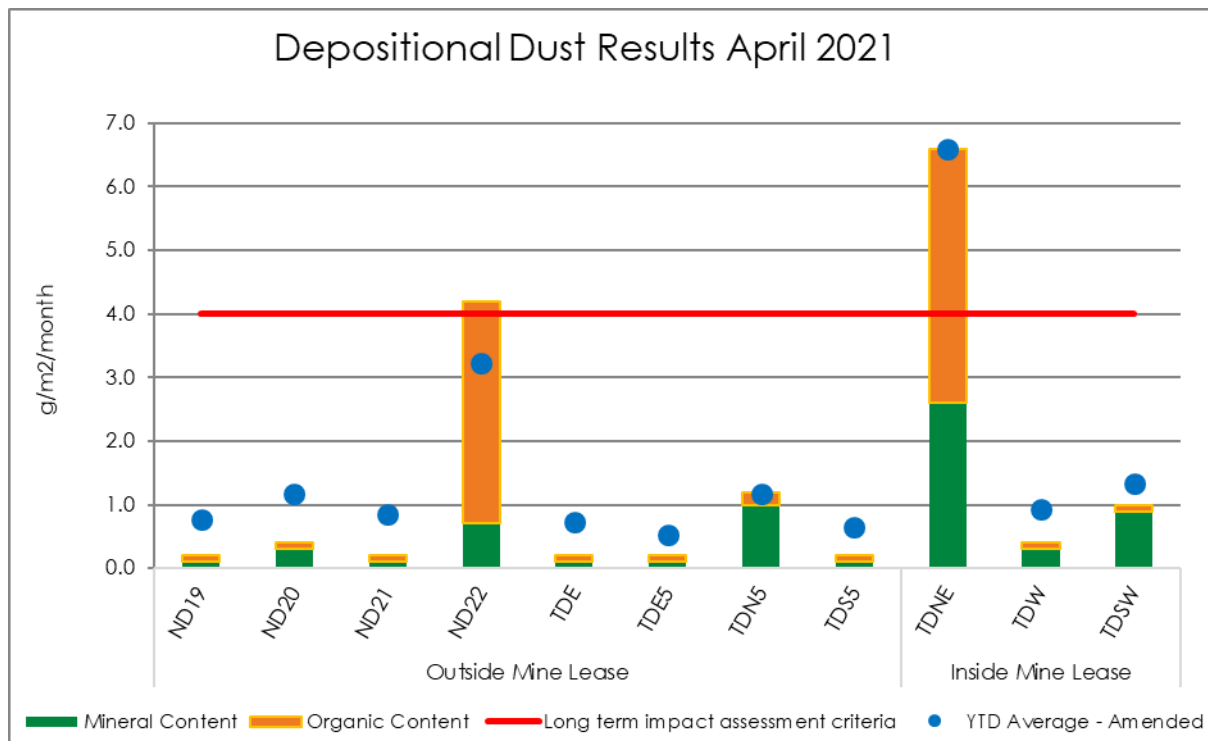


Figure 7: April depositional dust results for all locations

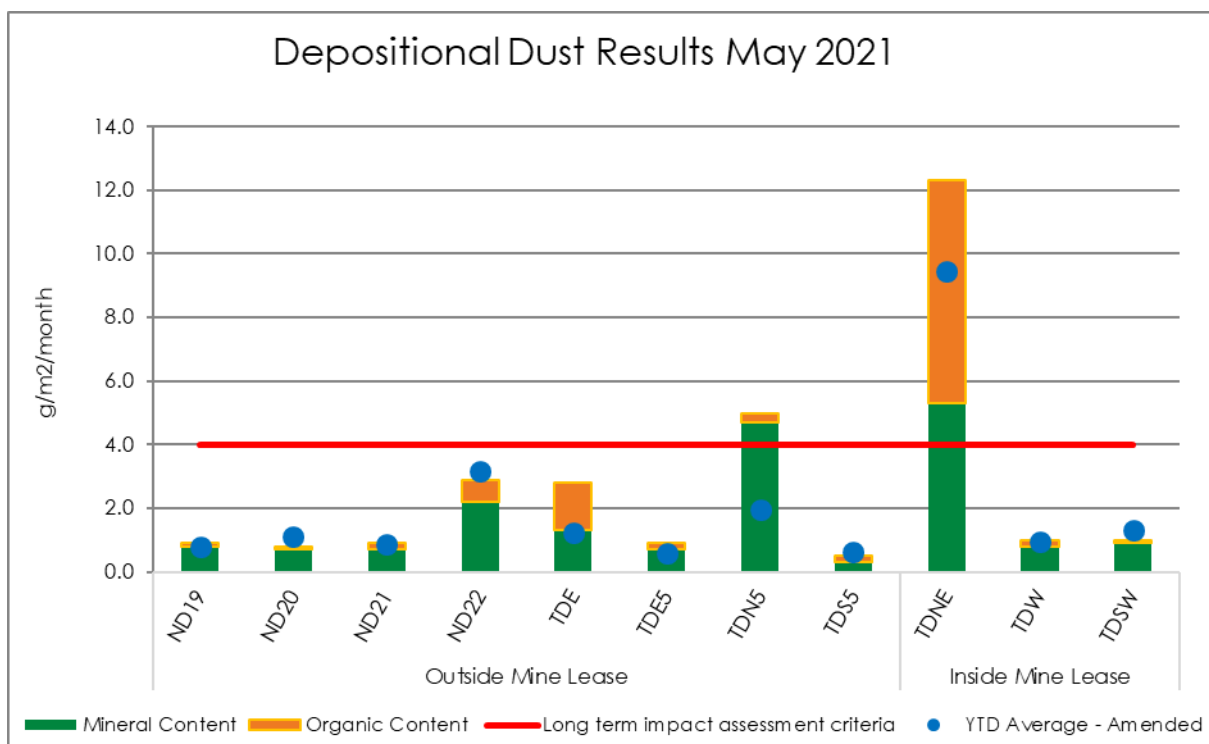


Figure 8: May depositional dust results for all locations

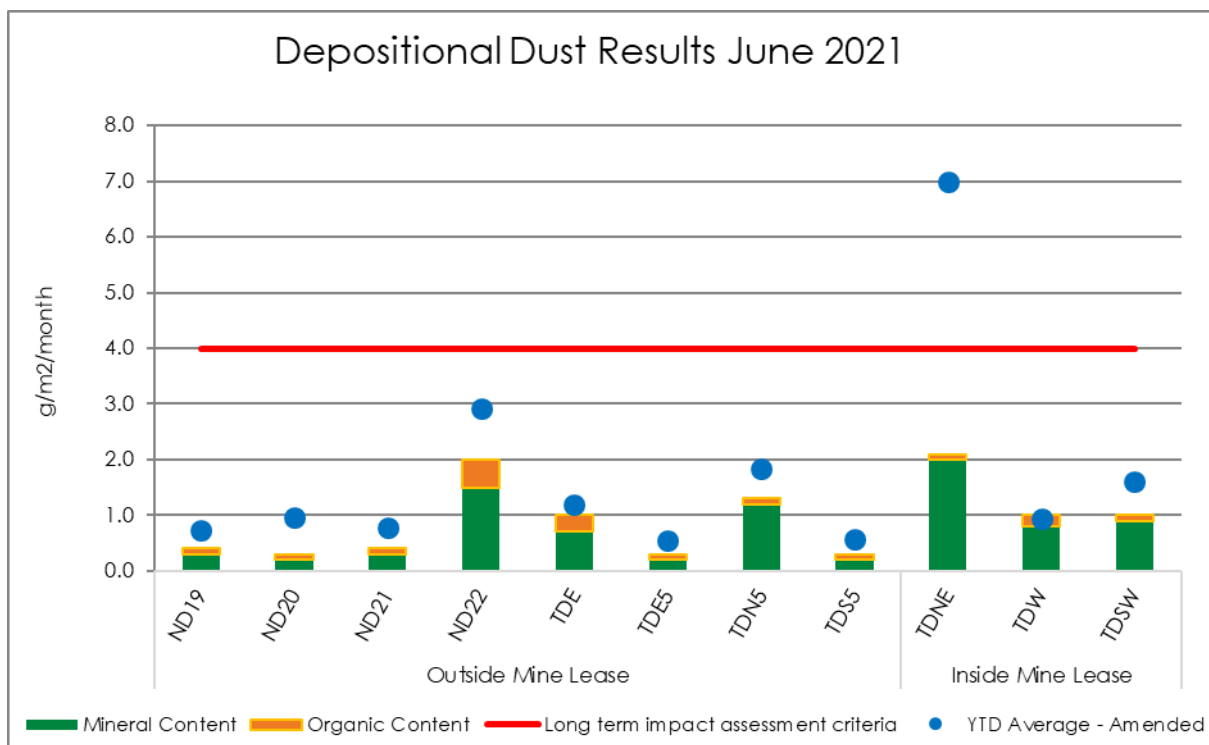


Figure 9: June depositional dust results for all locations

3. WATER

3.1 Overview

Water management at Northparkes is undertaken in accordance with approved management plans, prepared in accordance with the Consent. All water samples are analysed at an independent National Association of Testing Authorities (NATA) accredited laboratory.

Surface water quality monitoring is undertaken at Northparkes specifically within the three defined water management systems of;

- Clean water management system, which includes farm dams and watercourses;
- Dirty water management system, which includes settlement ponds; and
- Contaminated water management system, which includes all aspects of ore processing, and retention ponds.

The groundwater monitoring program at Northparkes aims to identify any changes to the natural groundwater system as a result of mining operations and ensure compliance with the Consent. It focuses on potential impacts to environmental assets and groundwater users in the area surrounding Northparkes.

Monitoring results are assessed and interpreted utilising historical trend analysis and internal water quality criteria and trigger levels to identify potential changes. Refer to Appendix C & D for map of all surface and groundwater dust monitoring locations.

3.2 Quarterly Monitoring Analysis

Water quality monitoring was carried out generally in accordance with the Consent, with no significant changes to the pH, EC or copper concentrations for all locations. A summary of the monitoring results at each location sampled are presented in Tables 1-7 below.

Table 1: Process Water System

Location	RP02	RP03	RP04	RP05	RP07	RP08	RP09	RP12	RP13	RP15	RP19	RP20
pH	8.12	8.33	8.29	7.97	8.78	7.46	8.08	8.79	8.29	8.27	8.25	8.1
EC (uS/cm)	2464.1	2228.1	353.29	549.76	1061.0	2120.7	4383.2	306.16	477.73	3393.7	4203.3	5596.3
Cu (mg/L)	0.024	0.05	0.135	0.014	0.01	0.043	0.038	0.044	0.069	0.026	0.008	0.026

Table 1 continued: Process Water System

Location	RP22	RP23	RP24	RP25	RP26	RP28	RP32	RP33	Caloola	PWD	GT02
pH	7.9	8.48	dry	8.6	8.83	8.37	8.68	7.92	8.32	8.25	9.36
EC (uS/cm)	695.24	892.7	dry	357.74	454.86	1165.2	1114.8	274.73	3971.3	2652.9	1299.2
Cu (mg/L)	0.046	0.037	dry	0.02	0.043	0.011	0.092	0.01	0.008	0.038	0.044

Table 2: Sediment Ponds

Location	SP03	SP10	SP15
pH	9.25	8.21	dry
EC (uS/cm)	1036.3	174.7	dry
Copper (mg/L)	0.006	0.040	dry

Table 3: Farm Dams

Location	FD04	FD05	FD06	FD07	FD11	FD16	FD18	FD25	FD26	FD27
pH	8.35	8.12	7.88	7.82	8.23	8.99	7.39	7.68	8.36	8.44
EC (uS/cm)	158.75	85.6	135.44	133.37	243.02	148.24	3307.9	220.27	383.42	285.65
Copper (mg/L)	0.034	0.019	0.018	0.012	0.03	0.025	0.015	0.011	0.019	0.015

Table 4: TSF Bores

Location	MB01	MB02	MB03	MB05	MB06B	W26	W27	W28	W29	W30	W31	W32
pH	7.31	7.19	6.36	6.76	6.86	7.31	11.7	6.95	12.49	7.08	7.74	11.48
EC (uS/cm)	6088.4	9742.8	22271	23997	17611	13267	18421	16138	20560	2576	694.53	2221.2
Copper (mg/L)	0.01	0.011	0.023	0.004	0.014	0.02	0.019	0.009	0.043	0.016	0.02	0.016

Table 5: Opencut Bores

Location	MB10	MB13	MB14	MB16	W14	W19	W20	W21	W22	W23	W24	W25
pH	6.89	6.95	7.69	6.78	7.31	7.78	7.21	8.19	6.86	6.82	8.02	8.05
EC (uS/cm)	13328	22624	861.31	17039	6477.3	5973.2	12417	24897	14636	15771	2049.3	2153.7
Copper (mg/L)	0.008	0.023	0.011	0.008	0.016	0.001	0.018	0.021	0.022	0.014	0.01	0.056

Table 6: Underground Bores

Location	MB17	MB18	MB19	MB20	P101	P102	P139	P145	P149
pH	7.19	11.7	7.41	7.49	7.19	7.3	6.06	6.37	6.87
EC (uS/cm)	2707.9	6319.6	15397	12278	10784	28416	27925	109.87	27811
Copper (mg/L)	0.011	0.021	0.005	0.037	0.003	0.001	0.01	0.009	0.02

Table 7: Regional Bores

Location	Moss #1	Wright	Far Hilliers	Long Paddock
pH	7.08	7.17	7.26	8.02
EC (uS/cm)	2280.4	1239.7	574.44	741.15
Copper (mg/L)	0.003	0.004	0.001	0.005

4. NOISE

Operational noise is managed by CMOC in accordance with the approved Noise Management Plan (NMP). The NMP covers all operational activities with the potential to generate noise at Northparkes. It details specific noise management and mitigation measures, outlines monitoring and reporting requirements and provides clear definitions of the roles and responsibilities for noise management.

4.1 Overview

CMOC undertakes a noise monitoring program that consists of both operator-attended and unattended surveys at the five nearest occupied residences 'Hubberstone', 'Milpose', 'Lone Pine', 'Hillview' and 'Adavale'. Refer to Appendix E for map of all attended noise monitoring locations.

Operator-attended noise measurements and recordings are undertaken outside the mining leases in order to quantify the intrusive noise emissions from construction and of general mine activity as well as the overall level of ambient noise. This noise monitoring was undertaken by an independent and suitably qualified noise professional.

4.2 Quarterly Monitoring Analysis

Attended noise monitoring was undertaken between 1 and 2 June 2021.

The assessment was completed to quantify site noise emissions against relevant noise criteria pertaining to Northparkes operations in accordance with Conditions 1 to 5 of Schedule 3 of the NSW Development Consent Conditions (DC11_110060), Northparkes Noise Management Plan (NMP, 2019) and Traffic Management Plan (TMP, 2019).

Road noise monitoring identified that vehicle movements associated with shift change generated levels below the relevant road noise criteria specified in the TMP and NMP.

Attended monitoring has identified that operational emissions generated by NPM comply with relevant noise criteria at all monitoring locations for all assessment periods. Furthermore, project related noise emissions are generally barely audible at monitoring locations. Extraneous non-mining sources such as traffic, insects, wind in trees, birds, aircraft, residential and agricultural noise were audible during the monitoring period. A summary of the monitoring results at each monitoring location are presented in Tables 8-13 below.

Table 8: Attended noise monitoring results for Hubberstone

Table 3 Operator-Attended Noise Survey Results – Location NM1, Hubberstone					
Date/Time (hrs)	Noise Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
Duration 15min	L _{Amax}	L _{Aeq}	L _{A90}		
Day					
13:51 02/06/2021	49	31	22	WD: NE WS: <0.5m/s Stab Class: D	Birds 20-61 Livestock 20-30 Traffic 20-37 Agricultural Noise 20-28 NPM Inaudible
14:06 02/06/2021	59	35	24		
14:21 02/06/2021	61	35	23		
Site L _{Aeq} (15min) Contribution			<30		
Evening					
19:13 02/06/2021	43	25	14	WD: NE WS: <0.5m/s Stab Class: E	Traffic 20-46 Dogs Barking 20-31 NPM Inaudible
19:28 02/06/2021	46	24	13		
19:43 02/06/2021	39	21	14		
Site L _{Aeq} (15min) Contribution			<25		
Night					
01:00 02/06/2021	43	21	16	WD: N WS: 0.1m/s Stab Class: G	Livestock 20-26 MAC Operator 30-43 Rural Noise <20 NPM Site Hum <20 (Barely audible for short periods)
01:15 02/06/2021	33	19	13		
01:30 02/06/2021	31	13	12		
Site L _{Aeq} (15min) Contribution			<25		
Site L _{A1} (1min) Contribution			<35		
Note: NPM denotes Northparkes Mines.					
Note: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.					

Table 9: Attended noise monitoring results for Lone Pine

Table 4 Operator-Attended Noise Survey Results – Location NM2, Lone Pine					
Date/Time (hrs)	Noise Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
Duration 15min	L _{Amax}	L _{Aeq}	L _{A90}		
Day					
16:43 02/06/2021	56	35	20	WD: N WS: 0.1m/s Stab Class: E	Birds 20-56
16:58 02/06/2021	72	48	22		Dogs Barking 20-26
17:13 02/06/2021	63	42	24		Traffic 20-72
					NPM Inaudible
Site L _{Aeq} (15min) Contribution					<30
Evening					
19:24 01/06/2021	69	46	13	WD: N WS: 0.1m/s Stab Class: E	Dogs Barking 20-45
19:39 01/06/2021	70	48	13		Traffic 20-70
19:54 01/06/2021	45	23	12		Rural noise <20
					NPM Inaudible
Site L _{Aeq} (15min) Contribution					<25
Night					
23:10 01/06/2021	43	15	12	WD: N WS: 0.1m/s Stab Class: G	MAC Operator 25-43
23:25 01/06/2021	35	17	12		Dogs Barking 20-36
23:40 01/06/2021	33	14	12		Rural Noise <20
					NPM Inaudible
Site L _{Aeq} (15min) Contribution					<25
Site L _{A1} (1min) Contribution					<35
Note: NPM denotes Northparkes Mines.					
Note: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.					

Table 10: Attended noise monitoring results for Milpose

Table 5 Operator-Attended Noise Survey Results – Location NM3, Milpose						
Date/Time (hrs)	Noise Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA	
Duration 15min	L _{Amax}	L _{Aeq}	L _{A90}			
Day						
14:53 02/06/2021	68	38	21	WD: NW WS: 1.0m/s Stab Class: D	Birds 20-68 Distant Traffic 20-31	
15:08 02/06/2021	68	40	20		Wind 20-31 Aircraft 28-46	
15:23 02/06/2021	65	43	21		Livestock 20-33 Agricultural Noise 25-68	
					NPM Inaudible	
Site L _{Aeq} (15min) Contribution					<30	
Evening						
21:10 01/06/2021	42	28	23	WD: NW WS: 0.1m/s Stab Class: G	Birds 20-42	
21:25 01/06/2021	36	27	24		NPM Plant 20-29	
21:40 01/06/2021	40	26	22		(Constant duration)	
Site L _{Aeq} (15min) Contribution					<30	
Night						
22:10 01/06/2021	39	25	22	WD: N WS: 0.1m/s Stab Class: G	Livestock 20-35	
22:25 01/06/2021	33	22	19		MAC Operator 25-40	
22:40 01/06/2021	40	24	20		NPM Plant 20-31	
					(Constant duration)	
Site L _{Aeq} (15min) Contribution					<25	
Site L _{A1} (1min) Contribution					<40	
Note: NPM denotes Northparkes Mines.						
Note: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.						

Table 31: Attended noise monitoring results for Hillview

Table 6 Operator-Attended Noise Survey Results – Location NM4, Hillview					
Date/Time (hrs)	Noise Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
Duration 15min	L _{Amax}	L _{Aeq}	L _{A90}		
Day					
12:39 02/06/2021	57	42	35	WD: NE WS: 1.5m/s Stab Class: D	Birds 30-73
12:54 02/06/2021	73	49	32		Wind 33-46
					Traffic 30-58
13:09 02/06/2021	53	39	31		NPM Inaudible
Site L _{Aeq} (15min) Contribution					<30
Evening					
18:00 02/06/2021	72	52	29	WD: N WS: 0.1m/s Stab Class: E	Traffic 25-63
18:15 02/06/2021	56	45	33		Birds 22-30
					Residential Noise 25-72
18:30 02/06/2021	63	47	35		Aircraft 35-43 NPM Inaudible
Site L _{Aeq} (15min) Contribution					<30
Night					
01:59 02/06/2021	43	28	25	WD: NW WS: 0.1m/s Stab Class: G	Livestock 20-33
02:14 02/06/2021	44	27	24		MAC Operator 30-44
					NPM Plant 20-30
02:29 02/06/2021	40	27	24		
Site L _{Aeq} (15min) Contribution					<30
Site L _{A1} (1min) Contribution					<40
Note: NPM denotes Northparkes Mines.					
Note: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.					

Table 12: Attended noise monitoring results for Adavale

Table 7 Operator-Attended Noise Survey Results – Location NM5, Adavale					
Date/Time (hrs)	Noise Descriptor (dBA re 20 µPa)			Meteorology	Description and SPL, dBA
Duration 15min	L _A max	L _A eq	L _A 90		
Day					
15:54 02/06/2021	61	40	21	WD: NW WS: 0.5m/s Stab Class: E	Birds 20-65
16:09 02/06/2021	65	39	21		Traffic 20-58
16:24 02/06/2021	55	36	21		NPM Excavator 20-22 (Barely audible for short periods)
Site L _A eq(15min) Contribution					<30
Evening					
20:14 01/06/2021	29	13	12	WD: NW WS: 0.1m/s Stab Class: F	MAC Operator 29-44
20:29 01/06/2021	34	13	12		Rural Noise <20
20:44 01/06/2021	44	14	12		NPM Inaudible
Site L _A eq(15min) Contribution					<25
Night					
00:01 02/06/2021	33	13	12	WD: NW WS: 0.1m/s Stab Class: G	MAC Operator 30-39
00:16 02/06/2021	39	13	12		Dogs Barking 20-31
00:31 02/06/2021	39	14	12		Rural Noise <20 NPM Inaudible
Site L _A eq(15min) Contribution					<25
Site L _A 1(1min) Contribution					<35
Note: NPM denotes Northparkes Mines.					
Note: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.					

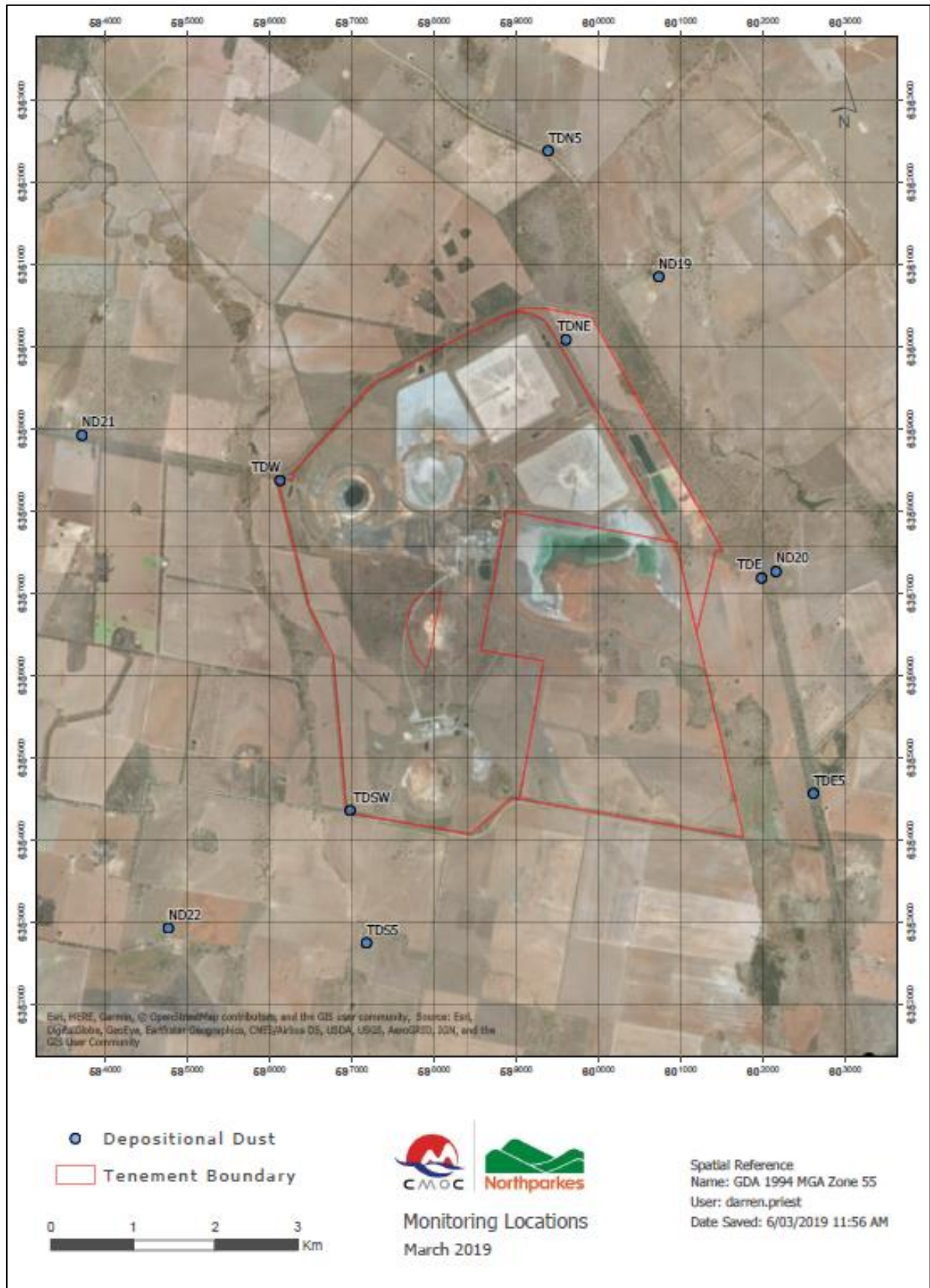
Table 13: Attended road noise survey results

Table 8 Operator-Attended Road Noise Survey Results – Location NM4, Hillview				
Date/Time (hrs)	Measured Noise Level	Meteorology	Criteria	Description and SPL dBA
Duration 1 hour	dB LAeq(1hr)		dB LAeq(1hr)	
12:39		WD: NE		Birds 30-73
02/06/2021	45	WS: 1.5m/s	55	Wind 33-46
(Day)		Stab Class:		Traffic 30-58
				NPM Concentrate Truck 40-58
				(1 pass - offsite)
				Approx. 21 vehicles enter/exit
				NPM Site
18:00		WD: N		Traffic 25-63
02/06/2021	48	WS: 0.1m/s	55	Birds 22-30
(Evening)		Stab Class:		Residential Noise 25-72
				Aircraft 35-43
				NPM Concentrate Truck 35-56
				(1 pass - offsite)
				Approx. 110 vehicles enter/exit
				NPM Site
Note: NPM denotes Northparkes Mines.				
Note: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.				

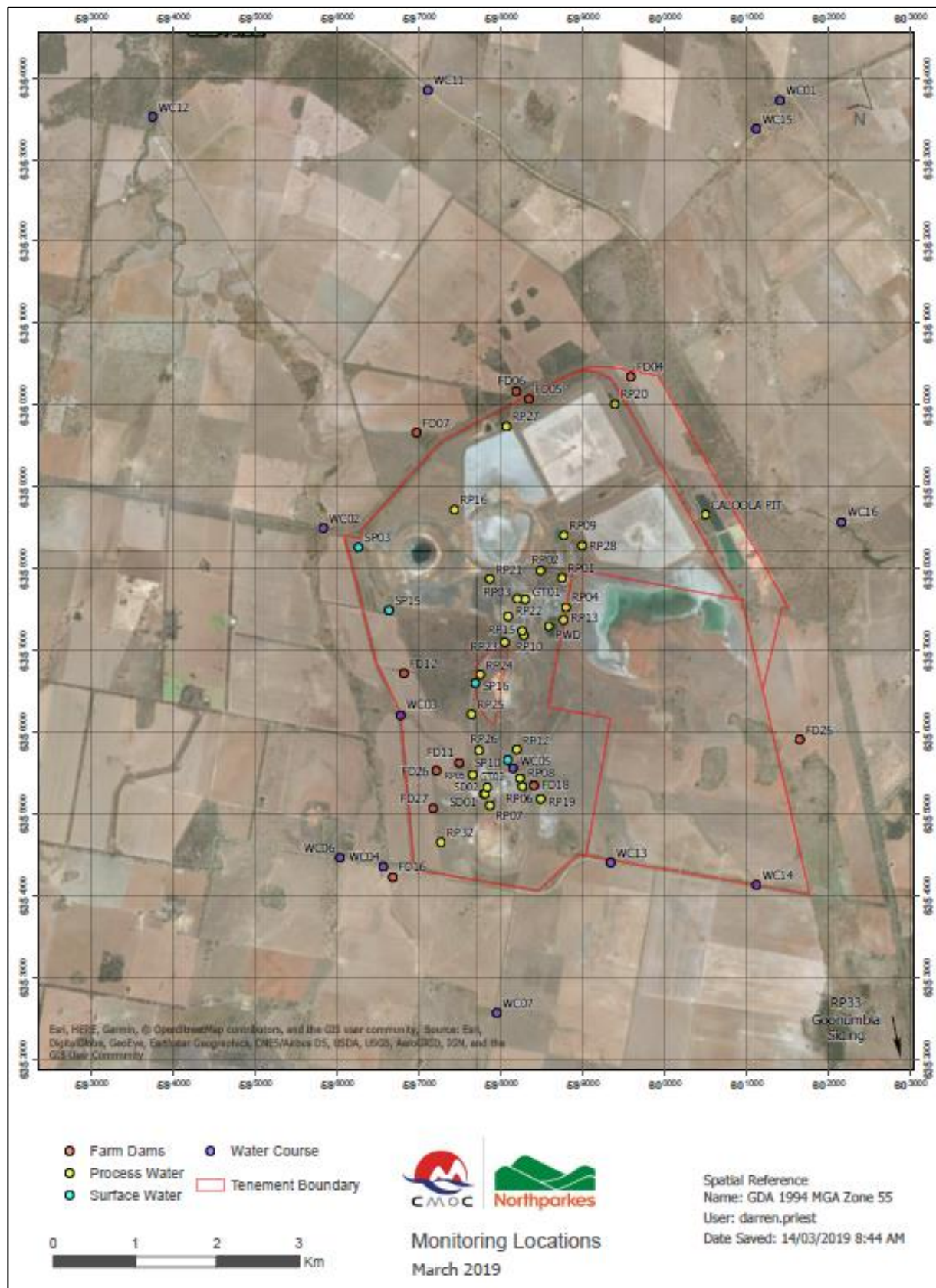
Appendix A – PM10/TSP Monitoring Locations



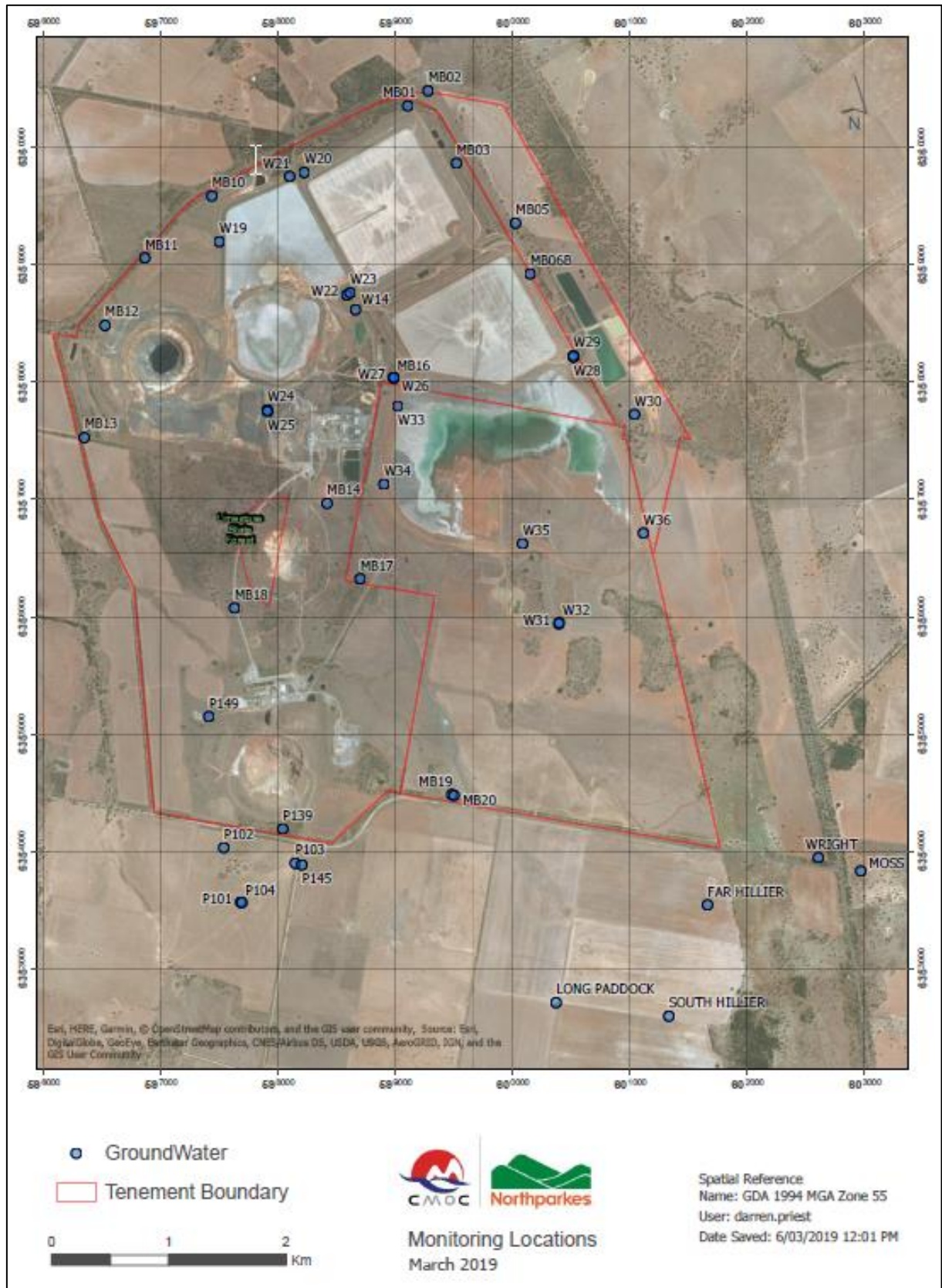
Appendix B – Depositional Dust Monitoring Locations



Appendix C – Surface Water Monitoring Locations



Appendix D – Groundwater Monitoring Locations



Appendix E – Attended Noise Monitoring Locations

